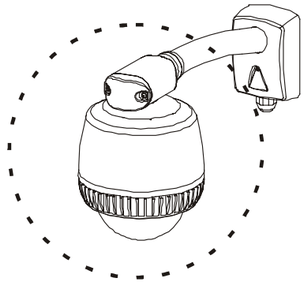


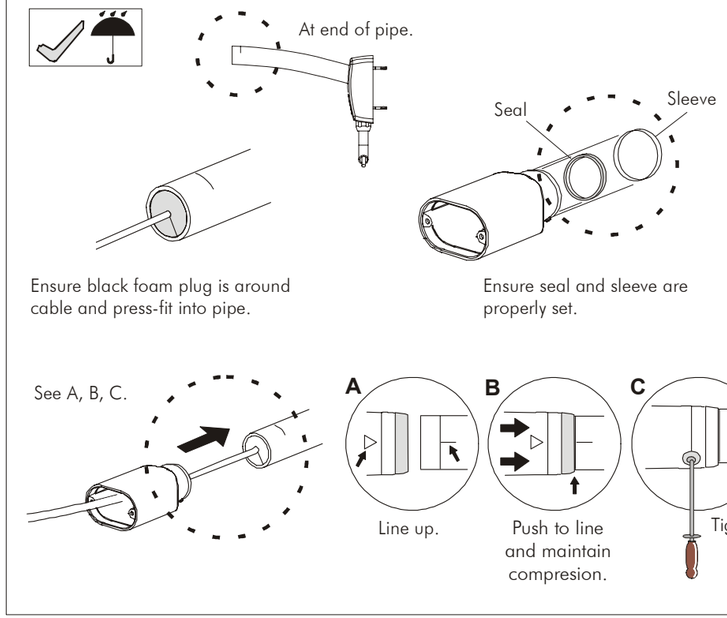
SpeedDome Ultra Outdoor Housing Installation Guide

RHODUL-03E/-03VRE (Clear Bubble), RHODUL-04E/-04VRE (Smoked Bubble)

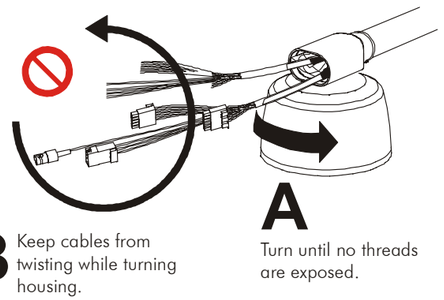
= Step Prevents Water Intrusion.

Before performing these steps, read additional information attached for important details and warnings!

IMPORTANT! This housing meets IP66/Nema 4 ratings provided it is used with a properly installed ROENDC End Cap Assembly and one of the following mounts: RHOTR Over-the Roof Mount, RHOSW Short Wall Mount, or RHOLW Long Wall Mount.

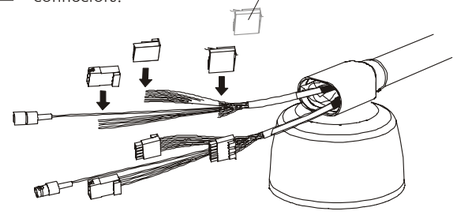


1 Thread cables through end cap assembly and attach housing to mounting structure.



2 Attach cable connectors.

Blue alarm connector used with -02 housings only.*



Green Connector (Power)

Pin 1 - 24Vac
Pin 2 - EMI Ground
Pin 3 - 24Vac

Black Connector (Data)

Manchester

Pin 1-4 - Not used
Pin 5 - White/Orange
Pin 6 - White/Yellow

RS-422

Pin 1 - Orange
Pin 2 - Green
Pin 3 - Yellow
Pin 4 - Brown
Pins 5-6 - Not used

SensorNet

Pin 1-4 - Not used
Pin 5 - White/Orange
Pin 6 - White/Yellow

Gray Connector (Relay)

Pin 1 - Blue (Relay NC)
Pin 2 - Purple (Relay armature)
Pin 3 - Gray (Relay NO, 3.5mA sink)
Pin 4 - White/Red (Alarm Return)
Pin 5 - White/Black (Alarm 1, 3.5mA sink)

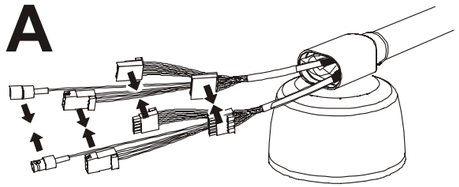
Blue Connector (Alarm)

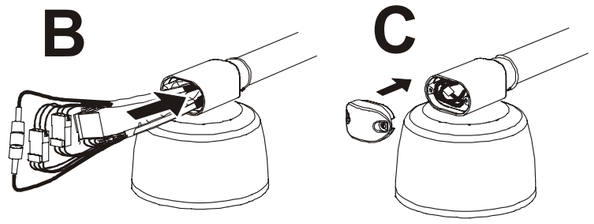
(-02 Housing only*)

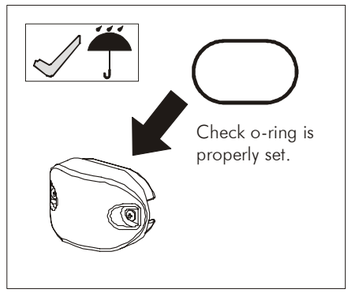
Pin 1 - White/Blue (Alarm 2, 3.5mA sink)
Pin 2 - White/Brown (Alarm 3, 3.5mA sink)
Pin 3 - White/Purple (Alarm 4, 3.5mA sink)
Pin 4 - White/Red (Alarm Return)

* 0100-2468-02 Standard Housing,
0101-0061-02 Vandal-Resistant Housing.

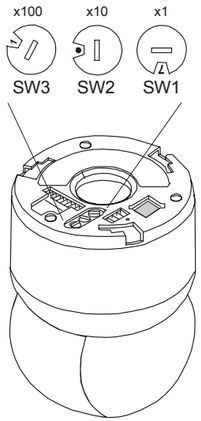
3 Make connections, insert cables into end cap assembly, and attach cover.







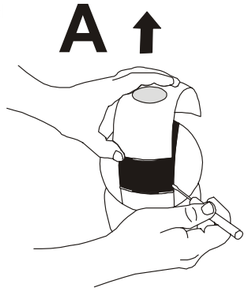
4 Set the dome address.

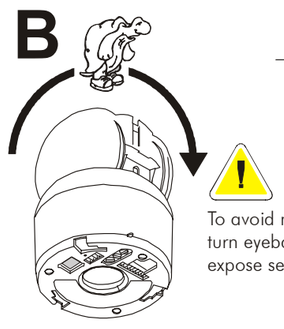


The address range is from 001 to 255, except for Manchester, which is 01 to 64.

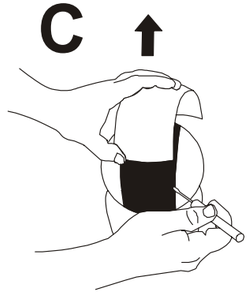
Set switches. Example: For address 107, set SW3 to 1, SW2 to •, and SW1 to 7.

5 Remove and discard both eyeball covers.



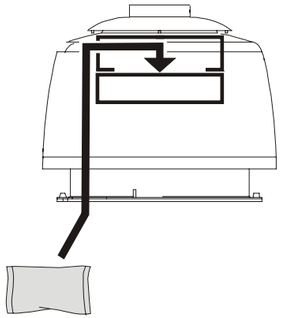


To avoid motor damage, turn eyeball slowly to expose second cover!

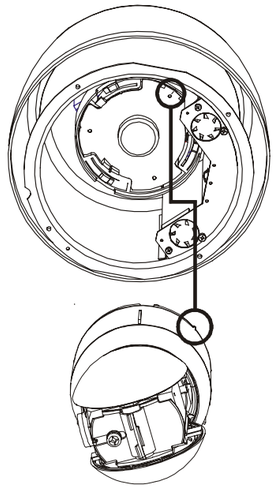


6 IMPORTANT! Both the outdoor housing and dome camera are shipped "terminated" for when they are installed at the end of a data cable. Should the cable continue to another dome, "unterminate" the housing. See information attached.

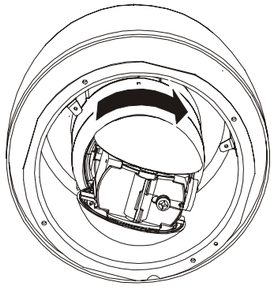
A Remove lining from adhesive-backed desiccant bag and affix bag, adhesive side down, to top of mounting base.



B Connect dome camera by aligning protrusion on dome with protrusion on the mounting base (-01 housing), or white mark on PC board (-02 housing).



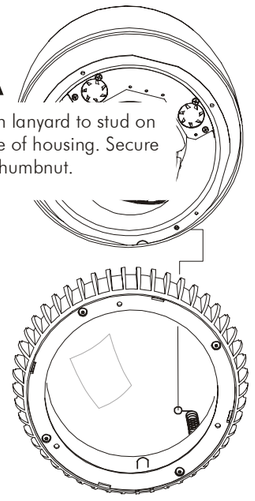
C Turn clockwise to lock.

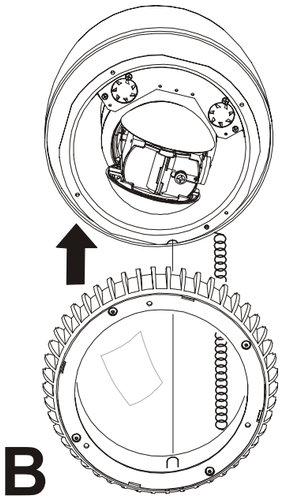


IMPORTANT! Power the dome (heater fans turn on) and check it performs its homing routine. During this routine, the camera lens moves up into the dome housing, down to the floor, pans slowly, and moves up to its home position. The controller can then be used to call up and control the dome. If OK, continue. If not, see "Troubleshooting" in information attached.

7 Attach bubble assembly.

A Attach lanyard to stud on flange of housing. Secure with thumbnut.



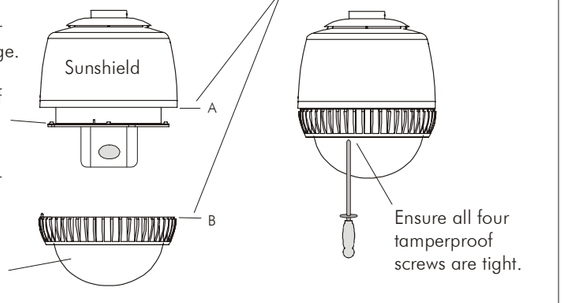


B Attach bubble to housing. Vandal-resistant version has additional shield installed.

Once the bubble is attached to the housing, surface A must meet surface B on all sides. Ensure lanyard is not caught between flange and trim ring gasket, or trim ring and sunshield.

Check for bent flange. Discard housing if found.

Check for cracks in bubble. Discard bubble if found.



SpeedDome® Ultra Outdoor Housing

Installation Guide - Continued

RHODUL-03E/-03VRE (Clear Bubble)
RHODUL-04E/-04VRE (Smoked Bubble)

Contents:

To the Installer 3
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Preventing Condensation 5
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Connector Pin Assignments 6
Cable Requirements 6
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To the Installer

This guide assumes that the outdoor mounting structure to which the housing is attached is in place and that data and power cables have been pulled to the installation site. To install the outdoor mounting structure, see documents shipped with the structure.

About the Product

The outdoor housing has a sunshield cover and bubble that protect the SpeedDome Ultra dome camera. Tamperproof screws affix the bubble to the housing.

The housing is temperature controlled and weatherproof. A built-in thermostat and heater prevent ice from forming on the outside of the bubble.

The standard version has one alarm input and one SPDT relay. The vandal-resistant version adds three more alarm inputs. Surge protection is provided on all external lines, including video.

Parts Supplied

- Housing assembly 0100-2468-02
- Bubble assembly 0404-0083-01/-02
- Tamperproof drive 1400-0149-01
- Install kit 0351-2183-04

Purchase or Supply Separately

Male BNC connector

Tools Required

- 6.6mm (1/4in) fixed-handle nut driver for Torx bit
- Wire cutters and strippers
- 2.5mm (0.1in) slotted screwdriver

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Warnings and Cautions

Please review the following warnings and cautions before you begin installation or service.

Warnings

WARNING! Always use proper lift and safety equipment for the location and type of installation. Use the safety features of the lift equipment.

WARNING! When connecting wires, ensure electrical power is not connected to the camera dome. The dome will move when power is applied. Also, ensure electrical power is not connected to nearby fixtures you might touch during installation.

WARNING! The camera dome runs on 24Vac. DO NOT connect line voltage to the dome.

North America power requirements: In North America, this device is intended to be supplied from a Class 2 power supply. For outdoor installations, use Class 3 wiring techniques, liquid-tight conduit, or liquid-tight pipe.

This installation should be made by a qualified service person and should conform to all local codes.

WARNING! DO NOT install this housing where combustible or explosive products are stored or used.

WARNING! EU power requirements: This product runs on 24Vac. In the EU, it is intended to be powered from a Limited Power Source. A limited power source is a certified source of SELV, and if inherently limited, with 8 amps maximum output current, and a maximum of 100VA available; or if not inherently limited, fused with a maximum value of 3.3 Amps, meeting section 2.11 of IEC950, and a maximum of 250VA available. The power supply can be obtained through American Dynamics or through another source where the provider can furnish the verification. This is required to assure electrical safety in the product.

Cautions

Water leaks, even small ones, can increase humidity inside the outdoor housing. To help eliminate humidity, follow all instructions explicitly and also the following cautions:

- DO NOT use over seals such as RTV and silicone caulks.
- Ensure fans spin when power is on.

Also see “Preventing Condensation” on page 5.

- To protect the bubble assembly, leave it in its box until you are ready to install it.
- Do not run data/power cables adjacent to or in the same conduit as line voltage mains power.
- Network cable/device requirements (additional requirements are listed on page 6):

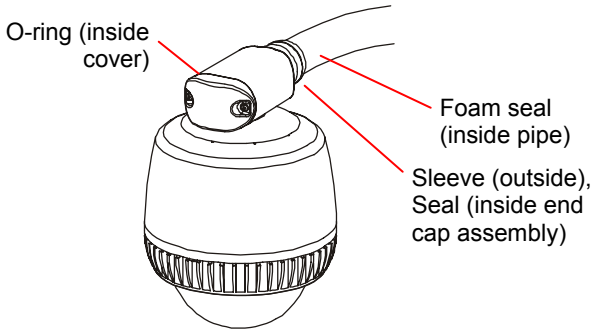
Network	Cable Thickness Required	Maximum Devices per Cable Run
SensorNet	22AWG	32
RS-422	22AWG	10
Manchester	18AWG	3

- Remove both slot covers from the eyeball to prevent overheating
- Keep cables within the housing away from the heater assembly
- If required, set data cable termination inside the housing (see “Unterminating the Outdoor Housing” on page 8).
- If possible, mount the housing so the least needed view (such as a wall, building corner, or pole) is opposite the fan/heater assembly.

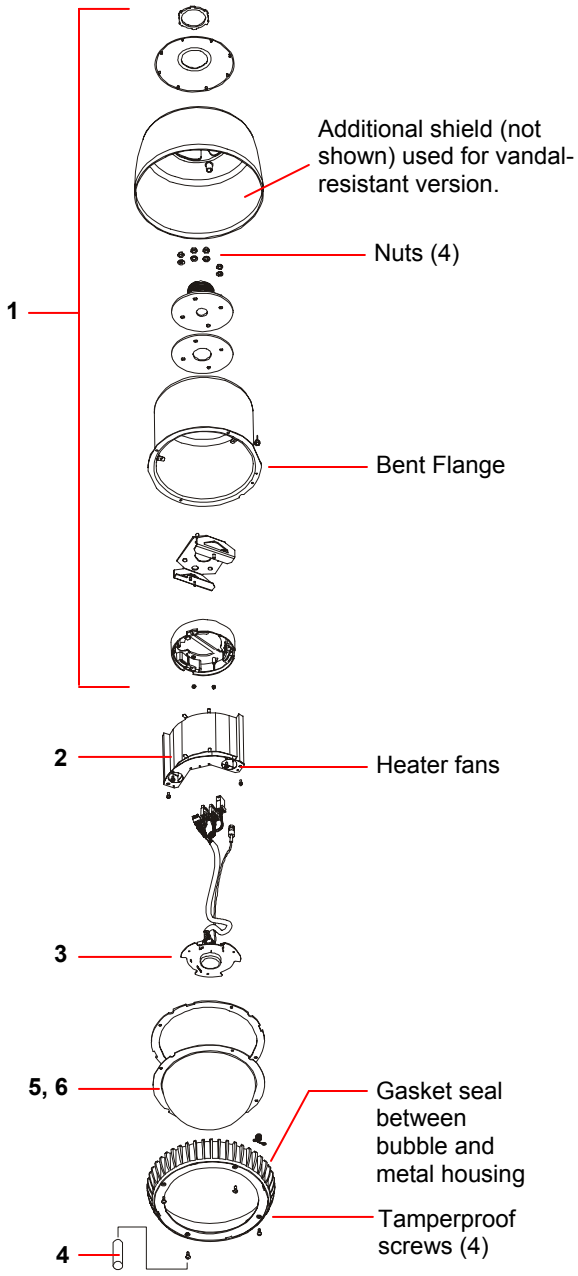
Preventing Condensation

Damage, missing parts, or procedures that most often allow water to enter the housing are as follows (refer to figures opposite):

- ☐ Mounts that allow water to enter the air path. If an older horizontal mount is used, replace it with a new model or ensure there is ample slope away from the camera dome and a foam plug is present
- ☐ Missing foam plug from entry into the pipe of the mounting structure
- ☐ Missing O-ring on cover, or missing sleeve or seal on end cap assembly
- ☐ Missing Teflon tape around any housing pipe threads
- ☐ RTV or similar sealant covering an air path
- ☐ Loose nuts (4) at the top of the housing
- ☐ Heater fans not turning
- ☐ Bent flange on metal housing that compromises the gasket seal between the bubble and the housing
- ☐ Plugged drain holes in the bubble trim ring
- ☐ Cracked bubble
- ☐ Tamperproof screws that are missing or improperly tightened compromise the gasket seal between the bubble and the housing
- ☐ Ensure lanyard is not caught between: a) flange and trim ring gasket, and b) trim ring and sunshield.



Exploded view



Parts List for Authorized Users

The parts listed below and shown in the exploded view can only be ordered by authorized users. To become authorized, contact your sales representative.

1. Housing Assy., 0404-0084-01
2. Fan/Heater Assy., 0400-0935-01
3. I/O Board with Cable Assy., 0300-2484-02
4. Drive, Tamperproof, 1400-0149-01
5. Bubble Assy. (Clear), 0404-0083-01
6. Bubble Assy. (Smoke), 0404-0083-02

Connector Pin Assignments

GREEN CONNECTOR (POWER)

Pin	Color	Description
1	N/A	24Vac
2	N/A	EMI ground
3	N/A	24Vac

BLACK CONNECTOR (DATA)

Manchester

Pin	Color*	Designation
1-4	—	Not used.
5	Black	Manchester (+)
6	White	Manchester (–)

RS-422 / SensorNet

Pin	Color*	Designation
1	Orange	RS-422 Data In High (+)
2	Green	RS-422 Data In Low (–)
3	Yellow	RS-422 Data Out High (+)
4	Brown	RS-422 Data Out Low (–)
5	Brown	SensorNet (unshielded)
6	Yellow	SensorNet (unshielded)

*Color based on composite cable.

GRAY CONNECTOR (RELAY OUTPUTS)

Pin	Color	Description
1	N/A	Normally Closed
2	N/A	Relay armature
3	N/A	Normally Open (3.5mA sink)
4	N/A	Alarm Return
5	N/A	Alarm input (3.5mA sink)

BLUE CONNECTOR (ALARM)*

Pin	Color	Designation
1	N/A	Alarm input (3.5mA sink)
2	N/A	Alarm input (3.5mA sink)
3	N/A	Alarm input (3.5mA sink)
4	N/A	Alarm Return

* -02 housings only. 0100-2468-02 standard housing, 0101-0061-02 vandal-resistant housing.

Cable Requirements

Data Cable

The table below shows requirements for SensorNet, RS-422, and Manchester networks. For more information about communication protocols and cable networks, see Communication Protocols and Cable Networks, 8000-2573-19.

Data cable requirements

	SensorNet	RS-422	Manchester
Cable type	1 unshielded, twisted pair*	2 shielded, twisted pair*	1 shielded twisted pair**
Wire gauge	22 AWG	22 AWG	18 AWG
Connection	Non-polarized	Polarized	Polarized
Max. devices on line	32	10	3

* Power, data, and video cables can be ordered separately or within a composite cable that can be ordered in various lengths. Plenum-rated cables must be used in indoor ceilings used for environmental air return (called "other air space" in the National Electrical Code). Order parts through your distribution network.

Note: If you order cable from an outside source, wire colors may be different.

** Belden 88760 (plenum), or Belden 8760 cable (non-plenum) cable is recommended. Plenum-rated cables must be used in indoor ceilings used for environmental air return (called "other air space" in the National Electrical Code). Order cable directly from Belden by calling 1-800-235-3361.

Power Cable

The camera dome and housing are to be connected to a Class 2 LPS, 24Vac, 80VA power source. Do not exceed the maximum outdoor Class 2 ratings of 30Vac, 100VA.

	18AWG	16AWG	14AWG
Low Line Voltage 102/204 Vac	60m (200ft)	100m (320ft)	160m (520ft)
Low Line Voltage 90/180 Vac	30m (100ft)	50m (160ft)	80m (260ft)

Manual Heater Operation
(-02 Housings Only)

The heater in the outdoor dome:

- Automatically turns on when temperature inside the housing drops below 18°C (64°F)
- Automatically turns off when the temperature inside the housing goes up to 23°C (73°F).

The heaters can be manually controlled to clear fog or light condensation, or to accelerate frost or ice removal from the outside of the bubble.

To Clear Fog or Light Condensation

To clear trapped fog or small amounts of condensation inside the housing bubble, turn on Output/Auxiliary 3 (cycled high/low mode) to operate the heaters at two temperature ranges for 23-minute cycles for 3 hours 23 minutes unless manually turned off.

To turn on Output/Auxiliary 3, enter **3** and press **Output On**. To turn off, enter **3** and press **Output Off.** Refer to controller/matrix switcher instructions for information about controlling outputs/auxiliaries.

To Accelerate Frost or Ice Removal

IMPORTANT! This procedure cannot be used on domes using the Manchester protocol. Manchester does not support latching Auxiliary 4. Only cycled High/Low mode is available. Attempting to use Auxiliary 4 results in turning off Auxiliary 3.

To accelerate frost or ice removal from the housing bubble, turn on Output/Auxiliary 4 (continuous high mode) to operate the heaters at high temperature for 3 hours 23 minutes unless manually turned off.

To turn on Output/Auxiliary 4, enter **4** and press **Output On**. To turn off, enter **4** and press **Output Off.** Refer to controller/matrix switcher instructions for information about controlling outputs/auxiliaries.

Command Priority

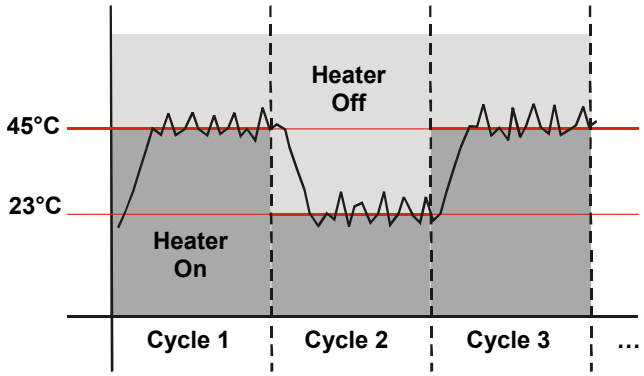
If both commands to control the heaters are issued in sequence, the first command runs to completion (3 hours 23 minutes), then the second command runs.

For example, the command to run the heaters on continuous high mode is issued (Output/Auxiliary 4 On). Five minutes later, the command to run cycled high/low mode is issued (Output/Auxiliary 3 On). The heaters will run on continuous high for 3.4 hours. After that time, the cycled high/low mode starts and runs for 3.4 hours.

How Heater Modes Operate

The difference between cycled high/low mode and continuous high mode is explained as follows:

Cycled high/low mode. High mode heats to 45°C (113°F) ±3°. Low mode heats to 23°C (73°F) ±3°. The graph below illustrates cycling by showing three heating cycles.

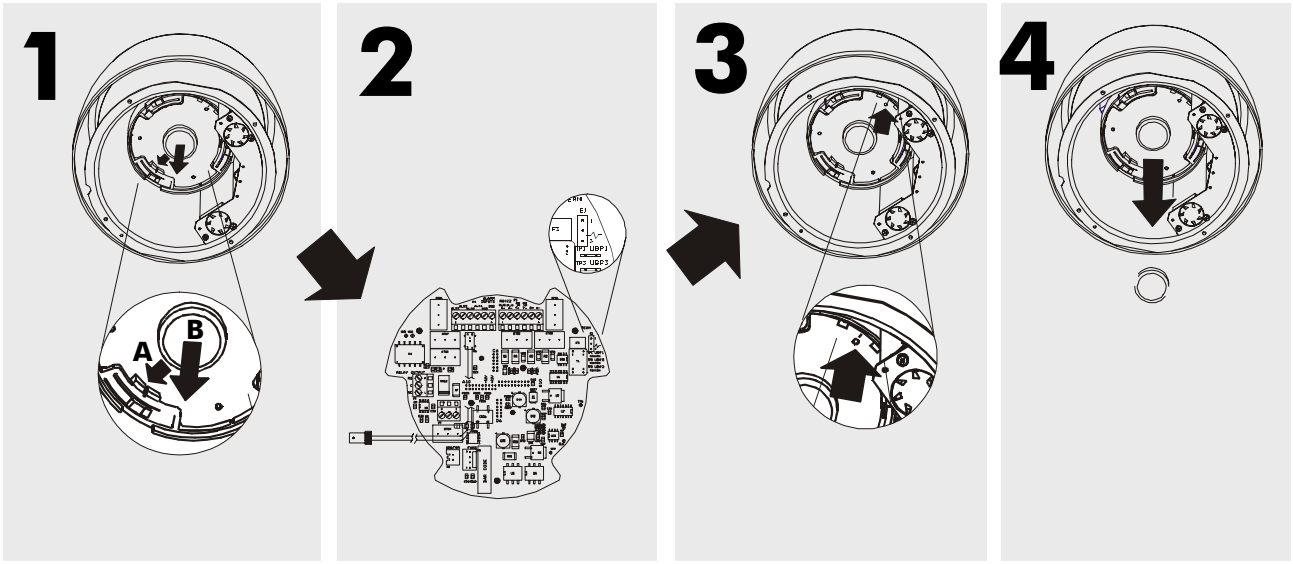


- Cycle 1 (high mode). The heater is on as long as temperature is less than 45°C. When temperature rises above 45°C, the heater turns off. This cycle continues for 23 minutes.
- Cycle 2 (low mode). The heater turns on when temperature drops below 23°C. When temperature rises above 23°C, the heater turns off. This cycle continues for 23 minutes.
- Cycle 3. High mode repeats for 23 minutes.

High /low cycling continues for 3 hours 23 minutes, unless manually turned off. After that time, the heater automatically turns off regardless of temperature, and remains off until manually turned on.

Continuous high mode. For protocols supporting it, Output/Auxiliary 4 turns on the heaters in continuous high mode. Continuous high mode heats the dome up to 45°C (113°F) ±3° for 3 hours 23 minutes, unless temperature exceeds 45°C or the heater is manually turned off.

Housing Termination



Both the outdoor housing and dome camera are shipped “terminated” for when they are installed at the end of a data cable. Should the cable continue to another dome, “unterminate” the housing using the procedure opposite.

IMPORTANT! Leave the dome camera set to “terminated”.

Unterminating the Outdoor Housing

CAUTION: The environmental circuit board inside the housing is static sensitive! Touch the metal housing to discharge it before touching the board.

1. As shown above, detach the circuit board from the housing by:
   A) Pushing fingers molded into the base away from the board while
   B) Pulling on the dust cover protecting the board’s spring finger connector.

   Note: Keep the dust cover in place for the next two steps.
2. On the top side of the circuit board, place jumper E1 across pins 1–2 for “unterminated”.
3. On the circuit board is a mark. To reattach the board to the housing, center the mark between fingers on the base and snap the board in place.
4. Gently remove the dust cover.

   Note: Keep the cover and use it to protect contacts should the environmental PC board need to be removed from the housing.

Troubleshooting

This section covers what to do when:

- Dome does not respond to commands
- Fans do not turn
- Picture is grainy or discolored
- Poor video
- Ice forms on bubble.

Dome Does Not Respond to Commands

Follow steps until the problem is corrected. See page 5 to order parts.

1. Detach the camera dome from the base and check the address switches. Are they set correctly?
   - YES: Continue.
   - NO: Set the correct address and reconnect the dome.
2. Verify power is reaching the housing. Press and hold switch SW2 on the environmental PC board and observe the green (ac power) LED. Does the LED glow steadily?
   - YES: Reattach the dome and continue.
   - NO: Check power at the J-box and ac cable connections at connector P7 on the other side of the environmental PC board. If OK, replace the PC board.

   Connector P7 pin outs

Pin	Color	Description
1	N/A	24Vac
2	N/A	EMI Ground
3	N/A	24Vac

   CAUTION: Use a 2.5mm (0.1in) slotted screwdriver. Using a blade too wide can damage connectors.

   CAUTION: Screws on the ac connector are delicate. DO NOT over tighten them!

3. Verify data is reaching the housing. SENSORNET or RS-422: Press and hold switch SW2 on the environmental PC board and observe the yellow (comm.) LED. The LED should blink (SensorNet) or glow steadily (RS-422).

   To verify RS-422 connections at connector P1, press and hold data test switch SW1 on environmental PC board. Check the nearby red and green LEDs; they indicate the following:

Constant green, Blinking red	RS-422 line is correctly wired.
Constant green, No red	RS-422 “Data In –” is shorted to circuit ground.
Constant red, Blinking green	“Data In + /–” wires are reversed.
Blinking red, Green off	“Data In +” is shorted to circuit ground.
Both LEDs off	“Data In +/–” wires are shorted or open.

P1 pin outs:

Manchester data connections (Ultra IV only)

Pin	Color	Designation
1-4	—	Not used.
5	Black	Manchester (+)
6	White	Manchester (–)

RS-422 Data connections

Pin	Color	Designation
1	Orange	RS-422 Data In High (+)
2	Green	RS-422 Data In Low (–)
3	Yellow	RS-422 Data Out High (+)
4	Brown	RS-422 Data Out Low (–)
5-6	—	Not used.

SensorNet Data Connections

Pin	Color	Designation
1-4	—	Not used.
5	Brown	SensorNet (unshielded)
6	Yellow	SensorNet (unshielded)

CAUTION: Use a 2.5mm (0.1in) slotted screwdriver. Using a blade too wide can damage connectors.

CAUTION: Screws on the connector P1 are delicate. DO NOT over tighten them!

4. Check fans. Are they on?
   - YES: Continue.
   - NO: Go to "Fans Do Not Turn" procedure on page 10.
5. Check video on monitor. Does the picture roll?
   - YES: Use the video controller or switcher to synchronize video vertical sync phases of all domes to the ac line. For specific instructions, see the installation and service manual for the controller or switcher.
   - NO: Continue.

   Is the picture normal?
   - YES: See "Detailed Troubleshooting" in the installation and service manual supplied with the dome.
   - NO: See "Poor or No Video" on page 10.

Fans Do Not Turn

Follow steps until the problem is corrected. See page 5 to order parts.

1. Determine if the dome camera is receiving power. Look for evidence such as a picture on the video monitor or dome movement.
2. Detach the dome camera to access the environmental PC board.

   Note: Power to fans comes from the dome. Fans will not function with the dome removed.

   CAUTION: Touch the metal housing before handling the environmental PC board.
3. Verify power is reaching the housing. Press and hold switch SW2 and observe the green (ac power) LED; it should glow steadily. If not, check power at the J-box and check that the ac cable is plugged into connector P7 on the top side of the environmental PC board.

   CAUTION: Use a 2.5mm (0.1in) slotted screwdriver. Using a blade too wide can damage connectors.

   CAUTION: Screws on the connector P1 are delicate. DO NOT over tighten them!
4. Check the fan connector. Is it plugged into connector P5 on other side of the environmental PC board?
   - YES: Replace fan/heater assembly 0400-0935-01. Remove two screws to remove assembly.
   - NO: Plug the connector in, reinstall the environmental PC board, and reconnect the dome. If fans still do not work, replace the fan/heater assembly.

Picture is Grainy or Discolored

Check the fans. If they are not turning, the camera dome may be overheating. See "Dome Does Not Respond to Commands" on page 9.

Poor or No Video

See "Dome Does Not Respond to Commands" on page 9.

Ice Forms on Bubble

Follow steps until the problem is corrected. See page 5 to order parts.

1. Are fans in the housing are working? If not, see “Fans Do Not Turn” opposite.
2. Is the camera dome receiving power? Look for evidence such as a picture on the video monitor or dome movement.
3. Detach the dome to access the environmental PC board.

   Note: Power to the heater comes from the dome. The heater will not function with the dome removed.

   CAUTION: Touch the metal housing before handling the PC board.
4. Verify power is reaching the housing. Press and hold switch SW2 and observe the green (ac power) LED; it should glow steadily. If not, check power at the J-box and if the ac cable is plugged into connector P7 on other side of environmental PC board.

   CAUTION: Use a 2.5mm (0.1in) slotted screwdriver. Using a blade too wide can damage connectors.

   CAUTION: Screws on the ac connector are delicate. DO NOT over tighten them!
5. Check the heater connector on other side of the environmental PC board. Is it plugged into connector P2?
   - YES: Unplug the heater cable and check heater resistance across pins of plug. Is the resistance approximately 16 ohms?

     If yes, replace environmental PC board 0301-0949-01. If not, replace fan/heater assembly 0400-0935-01 by removing the two screws.
   - NO: Plug the connector in, reinstall the environmental PC board, and reattach the dome. If the fans still do not work, replace the fan/heater assembly.

Specifications

Electrical (combined dome and housing)

Input Voltage	24 to 30Vac, 50/60 Hz UL Listed Class 2 Certified Limited Power Source
Design Tolerance	20 to 36Vac, 50/60 Hz
Power Consumption	80W max.
Power On In-Rush current	3A

Surge Protection:

Video	Series resistor of 3.9 ohms; low-capacitance Zener suppressor of 6.5V, 1500W, 500W, 10kA impulse-rated gas tube
Power Line	TVS rated at 60V, 1.5 joules, 250A 8/20µs impulse, 500W, 10kA impulse-rated gas tube
RS-422	Series resistor of 3.3 ohms; TVS rated at 5.6V, 40A, 0.1 joules, 8/20µs impulse, 500W, 10kA impulse-rated gas tube
Manchester/SensorNet	Isolation transformer coupled 2000Vrms; PTC fuse protects transformer; TVS rated at 5.6V, 40A, 0.1 joules, 8/20µs impulse, 500W, 10kA impulse-rated gas tube
Alarm Input	Series resistors of 33 ohms; TVS rated at 5.6V, 40A, 0.1 joules, 8/20µs impulse, 500W, 10kA impulse-rated gas tube
Auxiliary Output	1000V Isolation Form 1-C relay

Environmental

Operating Temperature	–40°C to 50°C (–40°F to 122°F)
Relative Humidity	0 to 95% non-condensing
Storage Temperature	–10°C to 50°C (–14°F to 122°F)
Wind loading	Sustained winds of 240Km/hour (150 miles/hour) when properly installed and mounted (wall, pole, ceiling, and over-the-roof mount with proper support)

Mechanical

Height	32.1cm (12.6in)
Diameter	24.4cm (9.6in)
Weight:	
Without dome	2.7kg (6.1 lbs.)
With dome	3.9kg (8.7 lbs.)
Mechanical connection	1.5in NPT

Declarations

Regulatory Compliance

Emissions	47 CFR, Part 15, Class A ICES-003 EN55022 Class B EN61000-3-2 EN61000-3-3 AS/NZS 3548, Class A CISPR 22
Immunity	EN50130-4
Safety	UL1950 CSA C22.2 No. 950 EN60950 IEC 60950

FCC COMPLIANCE: This equipment complies with Part 15 of the FCC rules for intentional radiators and Class A digital devices when installed and used in accordance with the instruction manual. Following these rules provides reasonable protection against harmful interference from equipment operated in a commercial area. This equipment should not be installed in a residential area as it can radiate radio frequency energy that could interfere with radio communications, a situation the user would have to fix at their own expense.

EQUIPMENT MODIFICATION CAUTION: Equipment changes or modifications not expressly approved by Sensormatic Electronics Corporation, the party responsible for FCC compliance, could void the user's authority to operate the equipment and could create a hazardous condition.

Other Declarations

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RLJ 08/2005